WE CLAIM:

1   1.   A method for resizing a pattern in real time to dynamically

2   photolithographically transfer an image of the resized pattern onto a surface, said method

3   comprising:

4   generating a first rendering of the pattern, the first rendering including first

5   pixel data representing the pattern;

6   generating a second rendering of the pattern, the second rendering including

7   second pixel data representing the pattern, the pattern in the second rendering being spatially

8   offset from the pattern in the first rendering; and

9   selecting portions of the first and second pixel data to form the resized pattern

10 and to dynamically photolithographically transfer the image of the resized pattern onto the

11 surface.

1   2.   The method of Claim 1, further comprising:

2   generating at least a third rendering of the pattern, the pattern in the third

3   rendering being spatially offset from the pattern in both the first and second renderings, said

4   selecting being performed based on at least the first, second and third renderings.

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1   3.   The method of Claim 1, wherein said generating the first rendering includes

2   mapping the pattern onto an array of light modulation elements within a spatial light

3   modulator in a first positional alignment relative to the array, and said generating the second

4   rendering includes mapping the pattern onto the array in a second positional alignment

5   relative to the array.

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1   4.   The method of Claim 3, wherein the first and second positional alignments are

2   offset by a fraction of a dimension of one of the light modulation elements.

1   5.   The method of Claim 1, further comprising:

2   determining a distortion in the surface and performing said selecting as a

3   function of the distortion.

1   6.   The method of Claim 5, wherein said determining further comprises:

2   positioning the surface in at least one position relative to an image sensor

3   operable to image at least one alignment feature located on the surface; and

4   calculating the location of the at least one alignment feature on the surface to

5   determine the distortion in the surface.

1   7.   The method of Claim 5, wherein said selecting further comprises:

2   defining a misalignment threshold;

3   selecting the first pixel data from a portion of the first rendering corresponding

4   to a first region of an array of light modulation elements within a spatial light modulator, the

5   portion of the first rendering producing a misalignment of the pattern relative to the surface

6   as a function of the distortion in the surface less than the misalignment threshold; and

7   selecting the second pixel data from a portion of the second rendering

8   corresponding to a second region of the array, the portion of the second rendering producing

9   a misalignment of the pattern relative to the surface as a function of the distortion in the

10   surface less than the misalignment threshold.

1   8.   The method of Claim 7, wherein said selecting the second pixel data further

2   comprises:

3   determining at least one region in the array where the misalignment of the first

4   rendering is greater than the misalignment threshold; and

5   selecting the second pixel data from the portion of the second rendering

6   corresponding to the at least one region of the array.

1   9.   The method of Claim 1, further comprising:

2   determining a distortion in at least one optical element, said selecting being

3   performed as a function of the distortion.

1   10.   A method for resizing a pattern in real time to dynamically

2   photolithographically transfer an image of the resized pattern onto a surface, said method

3   comprising:

4   generating two or more spatially offset renderings of the image, each spatially

5   offset rendering including respective pixel data representing the pattern, the pattern being

6   spatially offset between the renderings;

7   measuring a distortion; and

8   selecting the pixel data from portions of the two or more spatially offset

9   renderings as a function of the distortion to form the resized pattern and to dynamically

10   photolithographically transfer the image of the resized pattern onto the surface.

1   11.   The method of Claim 10, wherein said determining further comprises:

2   positioning the surface in at least one position relative to an image sensor

3   operable to image at least one alignment feature located on the surface; and

4   calculating the location of the at least one alignment feature on the surface to

5   determine the distortion in the surface.

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1   12.   The method of Claim 11, wherein said positioning further comprises:

2   aligning the surface relative to an optical element optically coupled to the

3   image sensor.

1   13.   The method of Claim 11, wherein said positioning further comprises:

2   aligning the surface relative to an optical element optically coupled to the

3   image sensor and the spatial light modulator.

1   14.   The method of Claim 11, wherein said calculating further comprises:

2   computing at least one of the following distortion characteristics: stretching,

3   shrinking, tilting and bowing.

1   15.   The method of Claim 10, wherein said selecting further comprises:

2   defining a misalignment threshold; and

3   selecting the pixel data from the portions of the two or more spatially offset

4   renderings that produce a misalignment of the pattern relative to the surface as a function of

5   the distortion in the surface less than the misalignment threshold.

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1   16.   The method of Claim 10, further comprising:

2   storing the pixel data from the spatially offset renderings by interleaving the

3   pixel data from each of the spatially offset renderings.

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1   17.   A dynamic photolithography system, comprising:

2   a spatial light modulator including light modulation elements for dynamically

3   photolithographically transferring an image of a pattern onto a surface; and

4   an image processing system operable to generate and store two or more

5   spatially offset renderings of the pattern, each spatially offset rendering including respective

6   pixel data identifying respective light modulation elements within said spatial light modulator

7   representing the pattern, the pattern being spatially offset between the renderings, said image

8   processing system being further operable to load select pixel data corresponding to selected

9   portions of the two or more spatially offset renderings of the pattern into said spatial light

10   modulator.

1   18.   The dynamic photolithography system of Claim 17, wherein the light

2   modulation elements are arranged in an array, and wherein said image processing system is

3   operable to generate the two or more spatially offset renderings of the pattern by mapping the

4   pattern onto the array in respective positional alignments relative to the array.

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1   19.   The dynamic photolithography system of Claim 18, wherein the positional

2   alignments are offset from each other by a fraction of a dimension of one of the light

3   modulation elements.

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1   20.   The dynamic photolithography system of Claim 17, further comprising:

2   an image sensor connected to provide an image of at least one alignment

3   feature located on the surface to said image processing system, said image processing system

4   being further operable to calculate distortion in the surface as a function of the location of the

5   at least one alignment feature on the surface.

1   21.   The dynamic photolithography system of Claim 20, further comprising:

2   an optical element optically coupled to said image sensor and aligned with the

3   surface.

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1   22.   The dynamic photolithography system of Claim 21, wherein said optical

2   element is optically coupled to said image sensor and said spatial light modulator.

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1   23.   The dynamic photolithography system of Claim 20, wherein the distortion

2   includes at least one of: stretching, shrinking, tilting and bowing.

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1   24.   The dynamic photolithography system of Claim 20, wherein the select pixel

2   data is loaded as a function of the distortion.

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1   25.   The dynamic photolithography system of Claim 24, wherein said spatial light

2   modulator includes active light modulation elements and reserve light modulation elements,

3   the select pixel data loaded into said spatial light modulator corresponding to at least a

4   portion of the active light modulation elements based on the distortion.

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1   26.   The dynamic photolithography system of Claim 24, wherein the image

2   includes subimages, the pixel data loaded into said spatial light modulator representing at

3   least a portion of one of the subimages based on the distortion.

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1   27.   The dynamic photolithography system of Claim 17, wherein the surface has a

2   distortion, and wherein said image processing system is further operable to define a

3   misalignment threshold and select portions of the two or more renderings producing a

4   misalignment of the pattern relative to the surface as a function of the distortion in the surface

5   less than the misalignment threshold.

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1   28.   The dynamic photolithography system of Claim 17, wherein the light

2   modulation elements are operable to be altered as a function of the loaded pixel data.

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1   29.   The dynamic photolithography system of Claim 28, wherein the light

2   modulation elements are liquid crystal elements.

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1   30.   The dynamic photolithography system of Claim 28, wherein the light

2   modulation elements are micromirrors.

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1   31.   An image processing system for use in a dynamic photolithography system,

2   comprising:

3   a storage unit for storing two or more renderings of a pattern to be

4   photolithographically transferred onto a surface, the pattern being spatially offset between the

5   two or more renderings;

6   a processor operable to generate the two or more spatially offset renderings,

7   each spatially offset rendering including respective pixel data identifying respective pixels

8   representing the pattern, said processor being further operable to access the storage unit and

9   retrieve select pixel data corresponding to selected portions of the two or more spatially offset

10   renderings.

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1   32.   The image processing system of Claim 31, wherein said image processing

2   system is further operable to calculate distortion in the surface and retrieve the select pixel

3   data corresponding to the selected portions of the two or more spatially offset renderings as a

4   function of the distortion.

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1   33.   The image processing system of Claim 32, wherein said image processing

2   system is further operable to define a misalignment threshold and select portions of the two

3   or more renderings producing a misalignment of the pattern relative to the surface as a

4   function of the distortion in the surface less than the misalignment threshold.